BOOKS. . .from p. 210

(except 6) essentially deal with unireactant systems, agents modifying their activities, and enzymes with various binding properties. Chapter 9 treats multireactant enzymes and is followed by three short treatments of isotope exchange, the effects of pH, and temperature. The basic approach is to identify a large number of specific models, each being a variation of unireactant or multireactant systems and equations relating velocity to reactant, product, and modifier concentration and sample graphs. This means that the beginning student learns enzyme kinetics by carefully examining a series of models largely based on unireactant systems. Presumably professional researchers are expected to use this compilation of models to find equations that allow them to interpret their experimental data.

In reviewing this book, I spot-checked equations and figures for accuracy and found only one error: On Page 43, in Figure II-6, the intercept on the X axis is said to have diagnostic value, which it does not possess because the log of a substrate concentration does not approach zero as a limit but rather negative infinity. (It would be better to plot the log of the ratio of [S] to $[S]_0$.) It should be emphasized, however, that the large number of examples given in this book made it impossible for even a majority of them to be checked in detail in the time available.

The value of this book as a text for teaching undergraduates and graduate students will depend upon the approach taken by the instructor in a particular course. For those instructors who approach the subject by dealing with a series of models emphasizing variations on unireactant systems, this should be a very good text. It is clearly written and generally accurate. However, the encyclopedic presentation of plots and equations may be confusing for the beginner. For those instructors who approach the subject in a more general way, this text will be very difficult to use. The widespread use of the simplifying, rapid reaction (quasi-equilibrium) assumption makes an approach beginning with the general equations awkward. In my own case, after a short introduction, I begin with a steady-state treatment in multireactant systems which is not presented in the text until page 505. In general I feel that students trained with the approach taken by this book will tend to use equations and models in a prescriptive way rather than developing their own analytical tools.

The second purpose of this book—to provide a reference work for professional researchers—has produced the most encyclopedic treatment of specific models and equations that I have seen. For the researcher who wishes to go and find a collection of such models with appropriate equations, this book will be ideal. In my own case, I prefer to develop empirical equations in order to define the behavior of a system statistically before searching for suitable models. Hence I would not find the approach taken by the book very useful.

Also, there is very little emphasis on statistical treatment of data. As far as I could determine, the book does not point out that secondary and tertiary plots of intercepts and slopes bring in large errors, and hence equations based on them may be in error. These equations need to be checked statistically using the primary data and a suitable least-squares fitting program. The appendix does contain a description of a least squares method and applies it to a simple straight line with a single substrate.

In summary this book is a well-written descriptive compilation of many models being used to interpret the kinetics of enzyme systems and therefore should be useful to students and researchers who wish to approach enzyme kinetics in this way.

JAMES R. FISHER
Department of Chemistry
Florida State University
Tallahassee, FL 32306

RUTH SAGER'S "CYTOPLASMIC GENES AND ORGANELLES" REVISITED

Cytoplasmic Genes and Organelles, *by Ruth Sager. Academic Press, New York, 1972, 405 p., illus., $12.50 (71-182609).*

Scientific monographs are not unlike boxing champions or Italian governments: their careers are but short. I have often wondered somewhat uneasily how many of the once important monographs on my office shelf are so hopelessly out of date that their only raison d'etre is to impress nonscientific visitors. Worse yet, most modern monographs are really only a collection of articles by different authors, often without a subject index or a common denominator over and above that supplied by the bindery. When Sager's book appeared in 1972, it was a rare exception. First, it was written by a single author. Second, it was the first book portraying the *entire* field of organelle biogenesis, one of the newest and most rapidly growing branches of molecular biology. Finally, it attempted to reach not only a small cluster of specialists but a large segment of the scientific community. Indeed, it seemed to be as much a textbook for advanced students as it was a monograph. For example, it featured many well-designed original illustrations, a glossary of technical terms, and even an appendix explaining some techniques for characterizing nucleic acids. This unusual combination aroused my curiosity, and I read the book with growing delight.

Since then three years have passed and the field of organelle biogenesis has scored impressive gains. The DNA molecules associated with chloroplast and mitochondria have been characterized in considerable detail; many of the proteins synthesized by these organelles have been identified; and "organelle genetics" has become firmly entrenched as an important scientific discipline. Perhaps most importantly, the field has been successful in attracting a considerable amount of young talent. This may perhaps reflect the fact that the biogenesis of chloroplast and mitochondria provides unique and fascinating possibilities for studying the interplay of two genetic systems in eukaryotic cells. Moreover, the possibility that mitochondria and chloroplast are descendents of once free-living bacteria and algae, respectively, has caught the fancy of a wide spectrum of biologists and triggered new speculations about the origin of eukaryotic cells and, indeed, about the meaning of life itself. As any reader of L. Thomas' delightful little book "The Lives of a Cell" will attest, the field of organelle biogenesis has finally come of age.

What has all this done to Sager's book? Very little, it seems. I have recently reread large sections of it and was astonished to find that it still is what it was several years ago: a comprehensive, clear, and immensely readable account of the genetics and the molecular biology of organelle formation. In view of the author's scientific background, it is not surprising that the book is perhaps strongest in outlining genetic foundations. The discovery of "extrachromosomal" genes in fungi, protozoans, and plants is described with great clarity and insight and with many useful diagrams and tables. Formal mitochondrial genetics (which was then quite new) is, of course, covered only briefly, but the material presented is still correct and most instructive.

Sager has also succeeded well in outlining the biochemical experiments that have led to our present picture or organelle formation, even though the biochemical parts often lack the critical perspective and accuracy of citation accorded to the "genetic" part. On balance, however, it is probably difficult to overestimate the achievement of this book. It would be premature to call it a "classic" (if only because the author is much too young for that), but it will probably remain the most impressive and comprehensive coverage of this subject for years to come.

GOTTFRIED SCHATZ
Biozentrum
Der Universität Basel
Abteilung Biochemie
Basel, Switzerland

Continued on p. 214